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(51) INT CL<sup>7</sup>

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(52) UK CL (Edition R )

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(56) Documents Cited

GB 2286334 A DE 003148892 A1 FR 000026157 A

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(58) Field of Search

UK CL (Edition R ) A4L LBRB LBRC LBRD LBRE LBRF  
LCC

INT CL<sup>7</sup> A61G 7/00 7/008 7/015

Online: EPODOC, JAPIO, WPI

(54) Abstract Title

Adjustable bed

(57) An adjustable frame for a bed to provide additional support, especially for the use of elderly or disabled people. The adjustable bed 10 has a frame which supports a mattress 20. The frame has two lateral sections 30, 32. The arrangement enables the left lateral section 30 or the right lateral section 32 to pivot upwards relative to the frame independently or simultaneously. The lateral sections are pivoted and raised using electronic motors which are controlled using a remote control unit. This enables the occupier of the bed to operate the frame themselves. The frame may have a head and back support section which can be raised and lowered. In addition, a leg support section can also be inclined or declined to suit the occupant of the bed. The frame may also have a knee support which can be raised to enable the occupant of the bed to maintain their legs in a bent state.

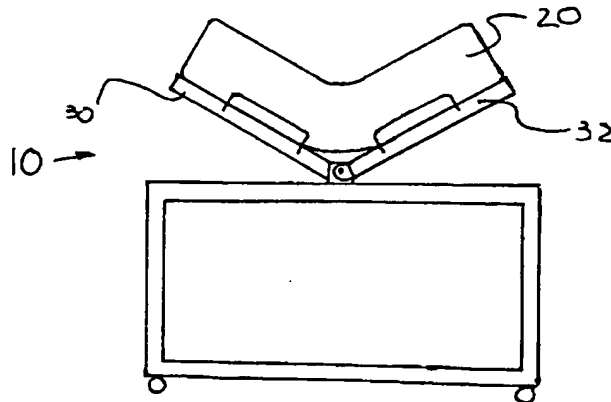
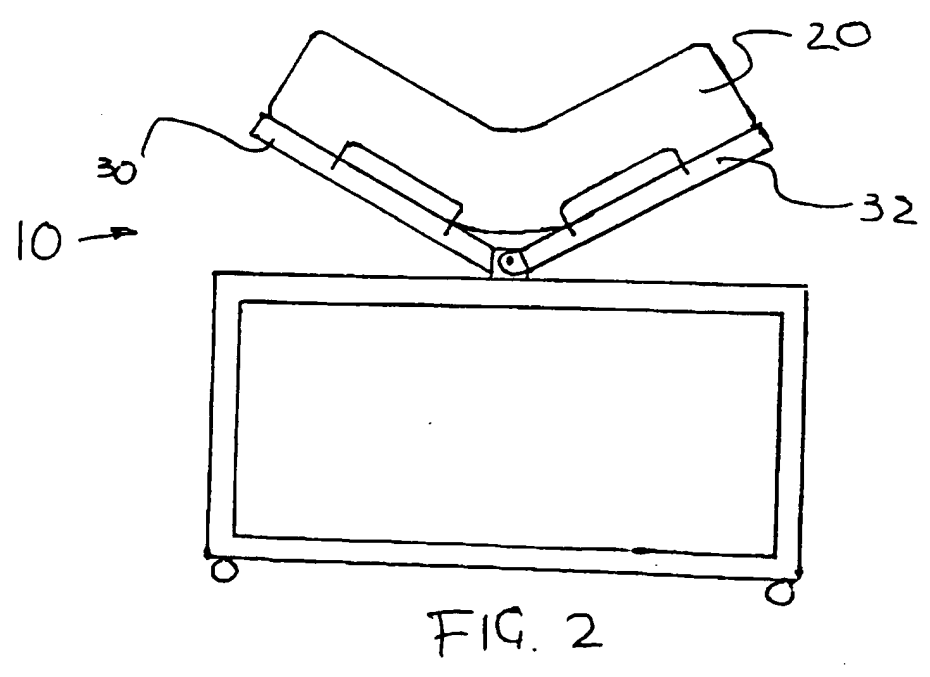
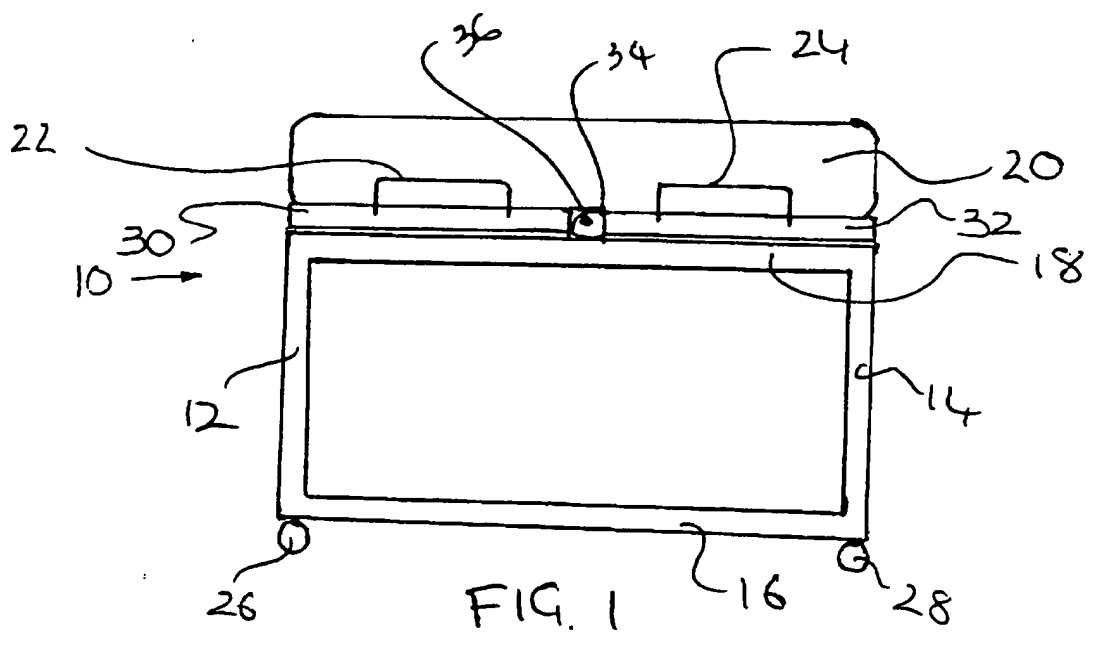


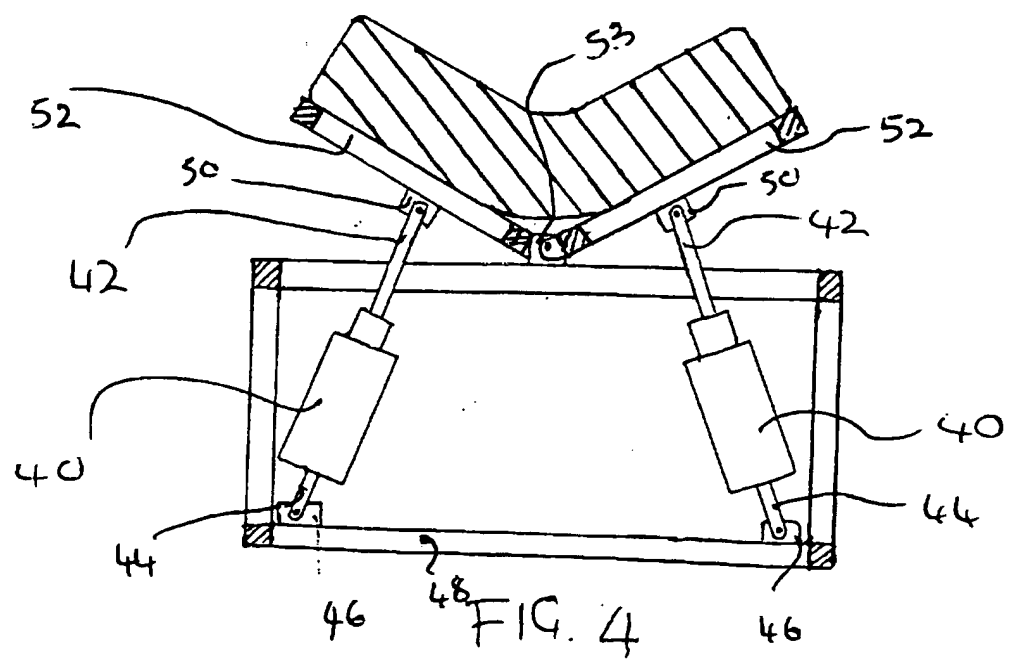
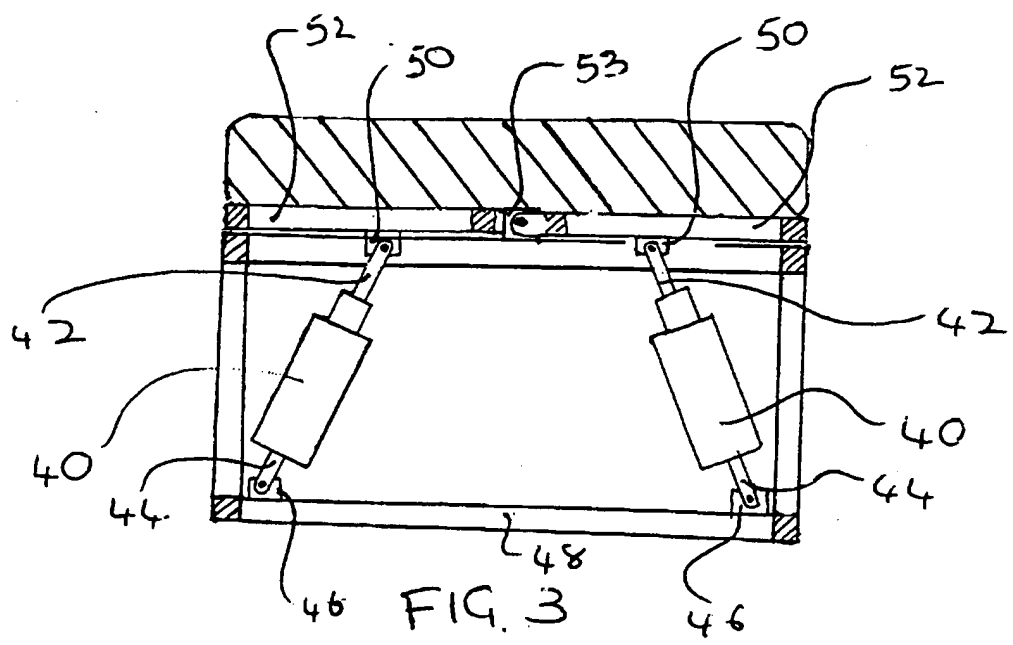
FIG. 2

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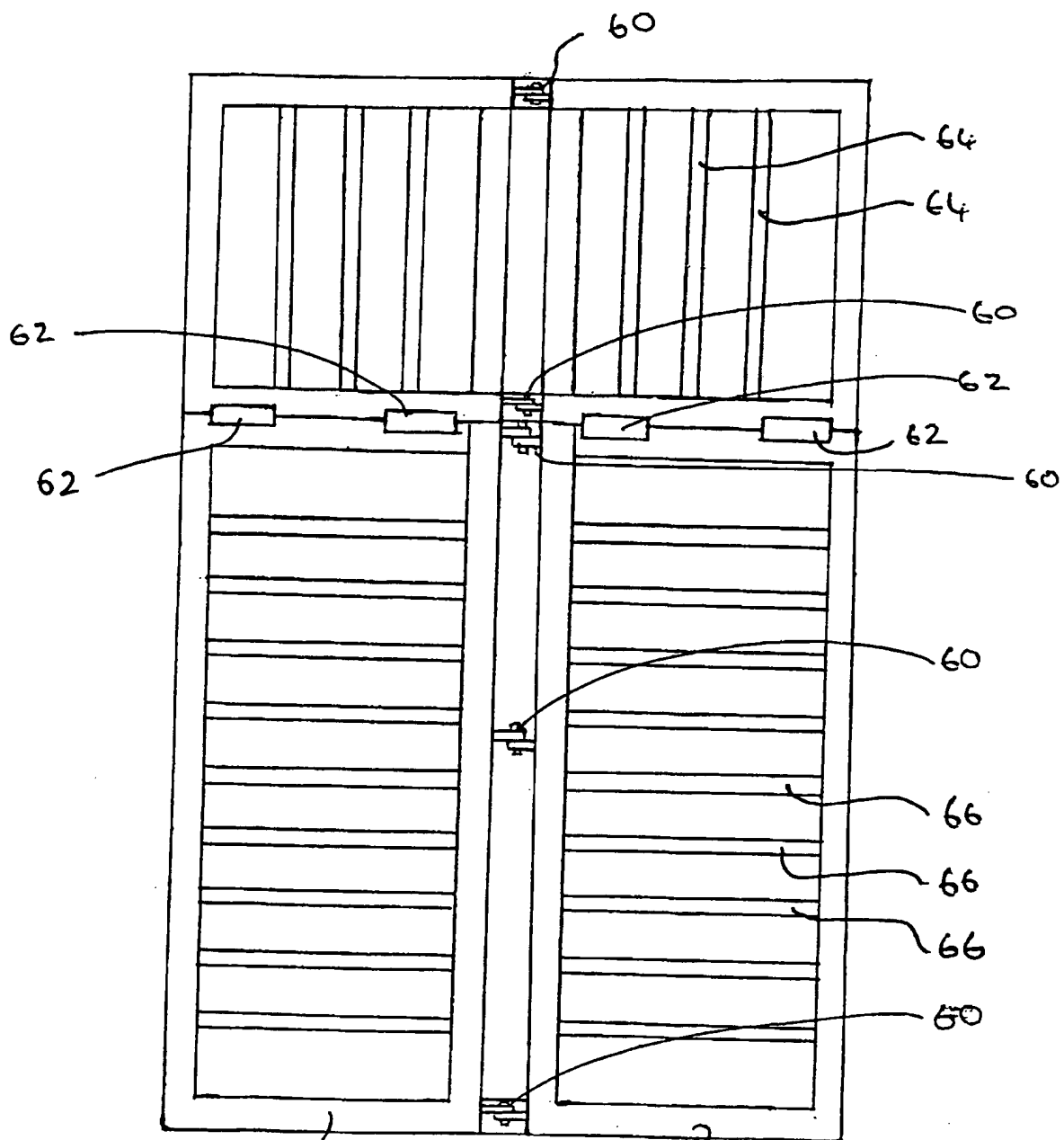
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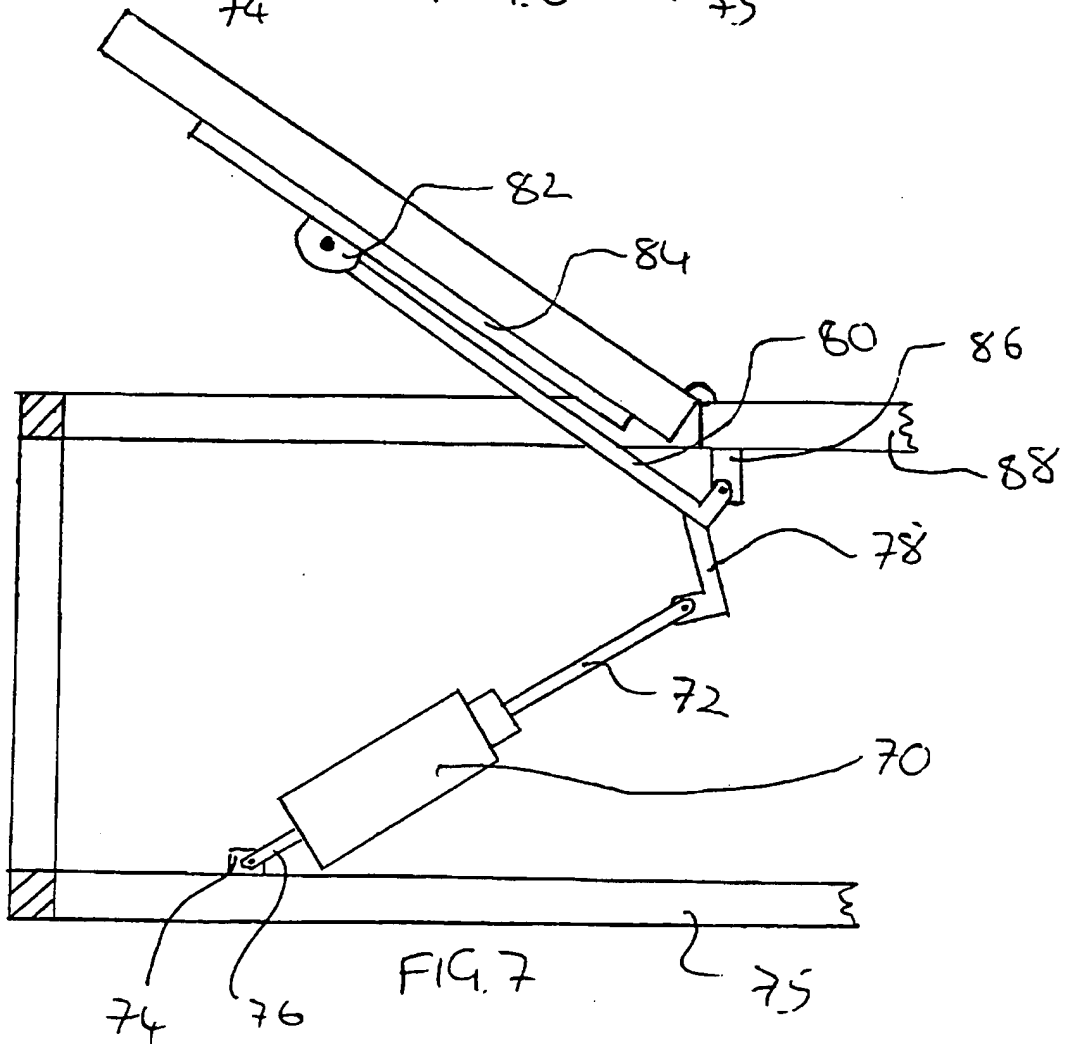
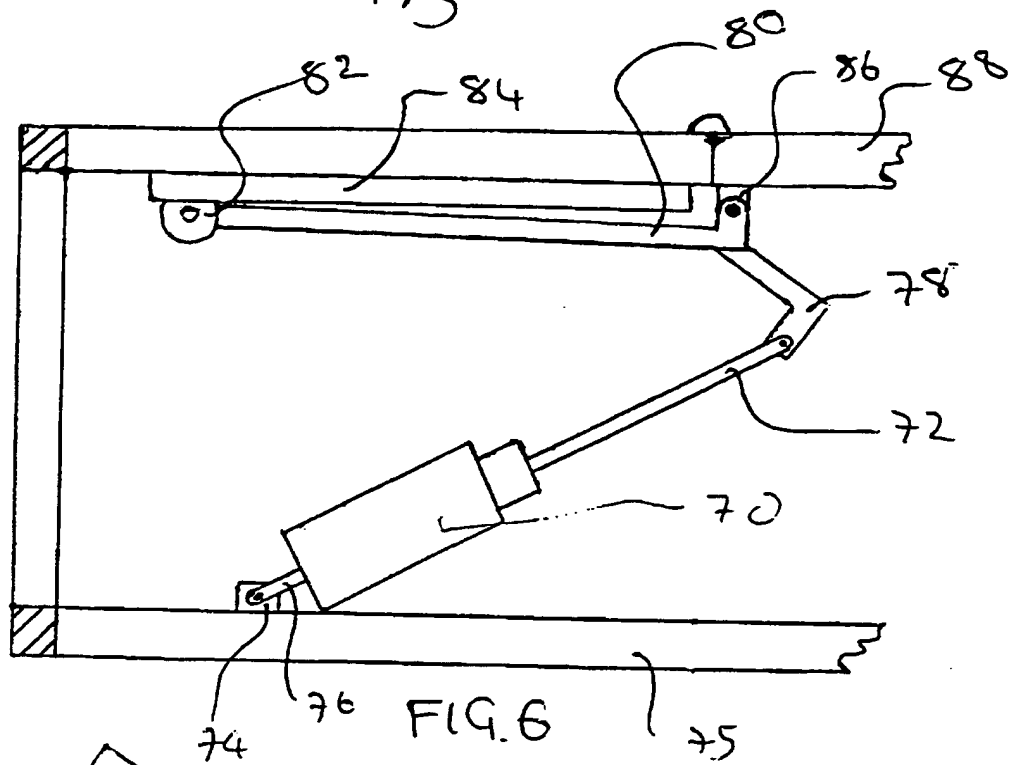
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30 FIG. 5

32

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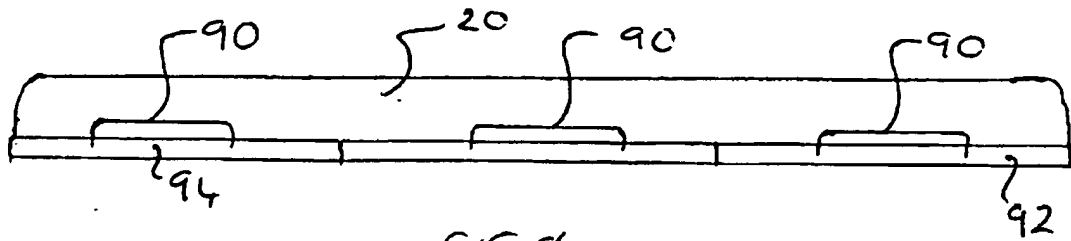


FIG. 8

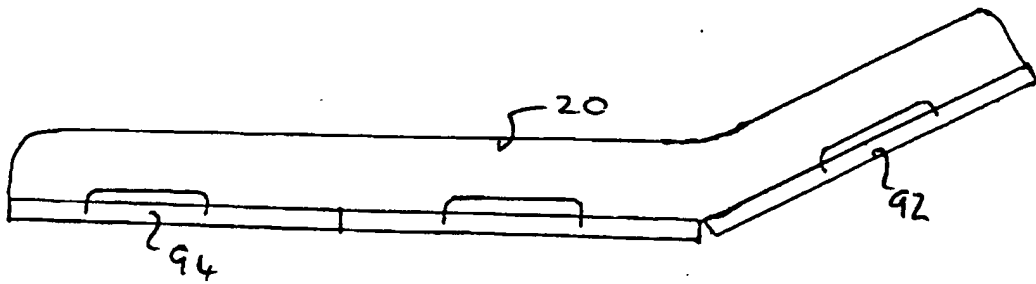


FIG. 9

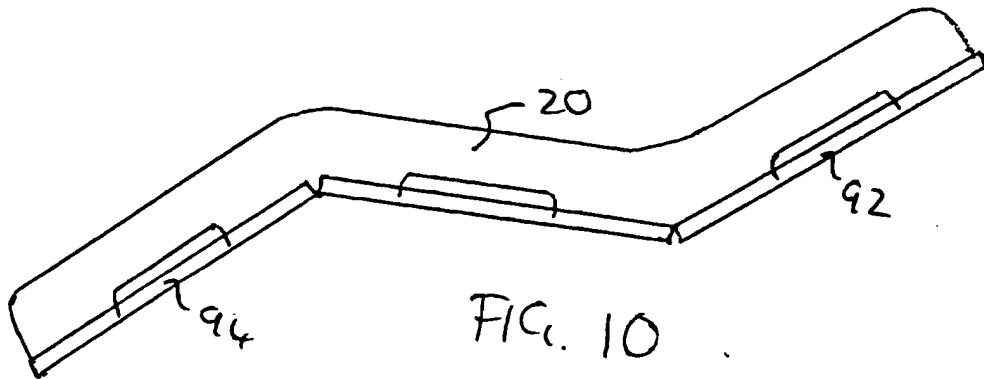


FIG. 10

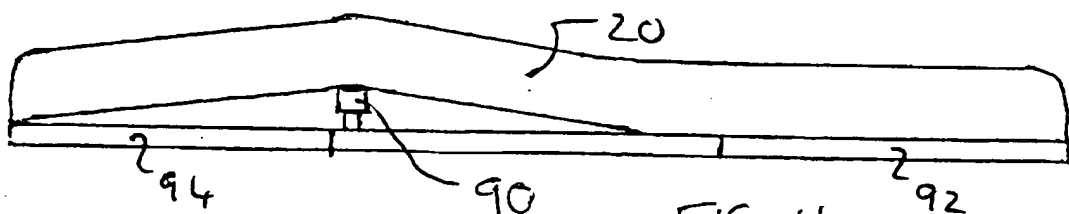


FIG. 11

## ADJUSTABLE BED

Field of the Invention

5 The invention relates to adjustable frames for beds to provide additional support, especially, but not limited to adjustable frames for beds for the use of elderly or disabled people.

10 Background to the Invention

Elderly and disabled people who spend long periods of time in bed are susceptible to bedsores. These people must be turned frequently in order to reduce the likelihood of  
15 bedsores. At present, health and safety regulations stipulate that three people must be used to turn the occupant of the bed. This is not efficient. In addition, large strains are placed on the back of the people turning the person over.

20

In addition, elderly, disabled people and people with motor control problems are at risk of falling out of bed, whether asleep or awake. This is a further problem in that the person may not be able to get back into the bed or  
25 even to raise an alarm. Barriers can be placed on the sides of the beds but these barriers may cause injury to the person or one of their limbs by striking the barriers.

A great number of disabled people find it impossible to  
30 either adjust their sleeping position or to arise from a prone position, i.e. at night when having retired to bed, without the help of another person which can be costly and

inconvenient. In addition, the disabled person experiences a lack of independence.

It is of extreme importance that a disabled person has to  
5 be turned or to have their position adjusted at regular intervals to maintain good circulation, ease cramps and avoid bedsores which can occur by remaining in one position for long periods.

10 Wheelchair users find it difficult to straighten their legs easily in bed. Frequently, disabled people or their helpers will place a pillow below their knees in order to raise their knees and to maintain the legs in a more comfortable slightly bent position. However, the pillow  
15 becomes more compact and the support provided reduces and, also, the pillow does not provide support across the full width of the bed. Furthermore, the pillow position may move and stable support is not provided.

20 It is an aim of the present invention to overcome at least one problem associated with the prior art whether referred to herein or otherwise.

#### Summary of the Invention

25

According to a first aspect of the present invention there is provided an elongate frame for a bed comprising at least one lateral section which is movable relative to the frame.

30

Preferably the frame comprises two lateral sections which are moveable relative to the frame.



Preferably the or each lateral section is hinged to the frame. Preferably the or each lateral section is hinged to a longitudinal support section of the frame. The longitudinal support section may be centrally located with  
 5 respect to the elongate frame.

Preferably the lateral sections are connected together by a hinge.

10 Preferably the or each lateral section is arranged to move from a first position to a second position in which the or each lateral section provides a lateral incline or decline with respect to the first position. Preferably the first position is substantially horizontal. Preferably in the  
 15 second position the or each lateral section is laterally inclined from the centre of the frame to the lateral side of the frame. Preferably the or each lateral section can be inclined up to substantially 90 degrees.

20 Preferably the or each lateral section laterally extends from the centre of the frame for substantially half the width of the frame. Preferably the or each lateral section longitudinally extends for substantially the full length of the frame.

25

Preferably the or each lateral section is arranged, in use, to support at least a part of a mattress. Preferably two lateral sections are arranged, in use, to support substantially the whole of the mattress.

30

Preferably the or each lateral section comprises at least one retaining member which is arranged, in use, to prevent movement of a mattress relative to the frame. Preferably,

retaining members are arranged adjacent to each edge of the frame.

The frame may comprise a metal and preferably comprises  
5 steel. Preferably the frame comprises elongate sections of box steel.

Preferably the or each lateral section comprises a series of slats. Preferably the or each lateral section comprises  
10 a series of lateral slats. Preferably the or each lateral section comprises a series of longitudinal slats. Preferably the or each lateral section comprises a series of lateral and longitudinal slats.

15 The or each lateral section may comprise metal and preferably comprises steel. Preferably the or each lateral section comprises elongate sections of box steel.

Preferably means are provided for moving the or each  
20 lateral section relative to the frame. Preferably the means are electronically operated and preferably using a remote control unit. Preferably the means comprise a unit having an extending member extending therefrom. Preferably the extending member moves relative to the unit.  
25 Preferably the extending member extends and retracts from the unit. Preferably the extending member is powered by mechanical means. Preferably the mechanical means is electronically controlled.

30 Preferably the unit is pivotally connected to the frame. Preferably the unit is pivotally connected to a lower section of the frame. Preferably the extending member is pivotally connected to the lateral section. Preferably the

extending member is pivotally connected to the lower side of the lateral section.

Preferably each lateral section has independent means for  
5 moving independently relative to the frame.

The frame may have a head and back support section which may be moved relative to the frame. Preferably the head and back section can be inclined relative to the frame.  
10 The head and back support section is preferably hinged to the frame.

Means may be provided to move the head and back support section relative to the frame.  
15

The frame may comprise a leg support section. The leg support section may be arranged to move relative to the frame. Preferably the leg support section can be declined relative to the frame. The leg support section may be  
20 hinged to the frame. Preferably means are provided to move the leg support section relative to the frame.

The frame may have a knee support. Preferably the knee support is movable relative to the frame. Preferably the  
25 knee support is arranged, in use, to raise a part of a mattress. Preferably the knee support is arranged, in use, to raise a laterally extending part of a mattress which preferably extends across substantially the full width of the mattress.

30

The knee support may comprise a laterally extending member. The knee support may comprise two laterally extending members. Preferably means are provided to raise

and lower the or each laterally extending member with respect to the frame. The knee support may be movable along a longitudinal axis of the frame.

5 Preferably the means for moving the head and back support section or the leg support section or the knee support are electronically operated and preferably using a remote control unit. Preferably the means comprise a unit having an extending member extending therefrom. Preferably the  
10 extending member moves relative to the unit. Preferably the extending member extends and retracts from the unit. Preferably the extending member is powered by mechanical means. Preferably the mechanical means is electronically controlled.

15 According to a second aspect of the present invention there is provided a kit for assembly into a frame, the frame being in accordance with the first aspect of the present invention.

20 According to a third aspect of the present invention there is provided a bed comprising a mattress and a frame, the frame being in accordance with the first aspect of the present invention.

25 The present invention includes any combination of the herein referred to features or limitations.

#### Brief Description of the Drawings

30 The present invention will now be described, by way of example only, with reference to the drawings that follow, in which:

Figure 1 is a side end view of an adjustable bed.

Figure 2 is a side end view of an adjustable bed with the  
5 lateral sections inclined.

Figure 3 is a cross section of an adjustable bed.

Figure 4 is a cross section of an adjustable bed with the  
10 lateral sections inclined.

Figure 5 is a plan view of the frame of an adjustable bed.

Figure 6 is a cross section of a part of an adjustable bed  
15 showing the head and back support section.

Figure 7 is a cross section of a part of an adjustable bed  
with the head and back support inclined.

20 Figure 8 is a side view of an adjustable bed in the prone  
position.

Figure 9 is a side view of an adjustable bed with the head  
and back support inclined.

25

Figure 10 is a side view of an adjustable bed with the  
head and back support inclined and the leg support  
declined.

30 Figure 11 is a side view of an adjustable bed with a knee  
support raised.

#### Description of the Preferred Embodiment

As shown in Figure 1, and adjustable bed 10 has a frame which supports a mattress 20. The frame has vertical side supports 12, 14 which are connected by horizontal supports 16, 18 at the upper and lower ends. The supports 12, 14, 16, 18 are sections of box steel. The frame is mounted on castors 26, 28 in order to be manoeuvrable.

The mattress 20 is supported on the frame. The frame has two lateral sections 30, 32. Retaining members 22, 24 extend upwardly from the lateral sections 30, 32 and prevent the mattress 20 moving relative to the frame. Similar retaining members are located around the periphery of the mattress and frame.

Each lateral section 30, 32 of the bed is attached to the supporting frame at a central location. The upper horizontal support member 18 has support plates 34 which extend vertically. Each support plate 34 has an aperture defined therein. Similarly, the lateral sections 30, 32 have support plates 36, 38 extending centrally therefrom. Each of the support plates also has an aperture defined therein. A shaft 36 is inserted through the apertures defined in the support portions of the lateral sections 30, 32 and the support plate projecting from the frame. There are five such arrangements spaced longitudinally along the length of the bed frame. This arrangement enable the left lateral section 30 or the right lateral section 32 to pivot upwards relative to the frame. The or each lateral section may pivot up to 90 degrees. This enables one lateral section to be raised in order for the bed to function as a sofa for day time use. This is advantageous

in a nursing home environment where a patient's room may have limited space.

The arrangement also enables both sections to  
5 simultaneously be positioned in an inclined position, as shown in Figure 2. With both lateral sections, 30, 32 inclined the mattress forms a generally U shaped surface. This surface means that a person lying on the mattress is encouraged to lie centrally along the middle of the  
10 mattress. The mattress prevents the person from accidentally or inadvertently rolling laterally whereby they may fall out of the bed. This method is preferable to having side barriers since such barriers may cause the patient or a limb of the patient to strike the barriers  
15 and thereby cause an injury.

Alternatively, only one of the lateral sections 30, 32 may be raised. This helps a patient or the occupant of the bed to turn over or help carers turn the patient or occupant  
20 over.

The lateral sections are pivoted and raised using electronic motors. The arrangement of the motors with respect to the bed frame is shown in Figures 3 and 4. The  
25 motors are electronically operated and have an extending member 42 which is pushed out of the motor unit 40 or pulled back in to the motor unit 40. The extending member 42 is mechanically moved in to and out of the motor unit 40 using a gear mechanism. Each lateral section has an  
30 independent motor unit 40 which are independently controlled. The motor units 40 are secured to the frame at a lower position. The motors have securement members 44 extending from the lower casing of the motor units 40. The

securement members 44 are secured to support brackets 46 provided on a lower horizontal section 48 of the frame. The securement members 44 are secured to the support brackets 46 by shafts which extend through apertures in the securement members 44 and the brackets 46. This, therefore, enables the motor units 40 to pivot with respect to the frame. Similarly, the extending members 42 are secured to brackets 50 provided on the lower face of horizontal slats 52 in the left lateral and right lateral sections of the bed. Again, shafts extend through apertures in the brackets 50 and in the extending members 42. This enables the motor units 40 to pivot with respect to the left or right lateral section of the bed.

The motors are controlled using a remote controlled unit (not shown) which may be hand held to be operated by the occupant in order for the occupant to achieve the most comfortable position for themselves. As the motor is powered the extending members 42 are mechanically forced to extend and push the lateral sides upwards. The lateral sides, thereby, pivot about the longitudinal central portion 53 of the frame. When the correct position is reached the motors are no longer powered and the extending members 42 remains in position. As the extending members extend the motor units 40 pivot with respect to the lower section of the frame. In addition, the extending members 42 pivot with respect to the lateral sections. This ensures that the motor units 40 and extending members remain aligned.

30

The upper supporting surface of the frame comprises box steel sections, as shown in Figure 5. The lateral sections extend along the full longitudinal length of the bed. Each



lateral section extends laterally from the centre of the frame of the bed to the edge of the frame of the bed. The lateral sections are pivoted to the frame at five locations 60 longitudinally spaced from one another. The frame also provides a section to support the head and back which pivots across the full width of the bed. However, the head and back support cannot be pivoted whilst the lateral sections are raised. The head and back support section comprises upper sections of the lateral support section. The head and back support sections are pivoted to the lower lateral sections at four locations 62. The head and back support section comprises laterally spaced slats 64 to support the mattress. The lower lateral sections comprise longitudinally spaced slats 66 to support the mattress.

The head and back support section is raised and lowered using a motor and lever arrangement, as shown in Figures 6 and 7. The motor unit 70 has an extending member 72 which extends therefrom. The motor unit 70 has a lower securement member 76 which extends downwardly and secures to a bracket 74 projecting upwardly from the lower frame member 75. A shaft extends through an aperture provided in the bracket 74 and the securement member 76. This enables the motor unit 70 to pivot with respect to the lower frame member 75. The extending member 72 is pivotally connected to a projecting member 78. The projecting member 78 is secured to a lever arm 80. The lever arm 80 is pivotally secured to a bracket 86 provided on the lower surface of the upper frame 88. A wheel 82 is secured to the upper end of the lever arm 80 and the wheel 82 is able to rotate with respect to the lever arm 80. Two lever arms 80 and two wheels 82 are provided and are spaced laterally from

one another, although this is not shown in the side view of Figures 6 and 7. The wheels 82 locate in rails 84 which are provided on the lower surface of longitudinal slats on the head and back support portion.

5

When the motor unit 70 is powered the extending member 72 is mechanically drawn into the motor 70. This causes the projecting portion 78 and lever arms 80 to rotate with respect to the bracket 86 and upper frame member 88. The  
10 wheels 82 push the head and support section upwards and move along the rails 84 as the position of the wheels 82 moves with respect to the rails 84. The head and back section can, therefore, be raised and lowered to a suitable and comfortable position by the occupant of the  
15 bed using the remote control unit.

The bed can be adjusted to several configurations, as shown in Figures 8 to 11. Retaining member 90 are arranged adjacent to each edge of the frame to prevent movement of  
20 the mattress relative to the frame. This is especially important in order for the mattress to follow the configuration of the frame. As shown in Figure 8, the bed may provide a flat surface in order for the occupant to lie prone. The back and head portion 92 may be inclined to  
25 suit the occupant of the bed, as shown in Figure 9. In addition, a leg support section 94 can also be inclined or declined to suit the occupant of the bed, as shown in Figure 10. The mechanical arrangement is not shown although it is appreciated that the leg support section 94  
30 could be arranged similar to the mechanisms already described.

As shown in Figure 11, a laterally extending member 90 can be used to raise a part of the mattress 20 in order to provide a knee support. Wheelchair users sometimes find it uncomfortable to straighten their legs. Accordingly, the  
5 laterally extending member 90 provides a raised part of the mattress 20 which enables the occupant of the bed to maintain their legs in a bent state. The laterally extending section can be raised and lowered using similar technology as to that previously described. The laterally  
10 extending section may comprise two sections which raise up through the lateral slats of the lateral sections of the frame.

The knee support can be arranged to be located at  
15 different longitudinal positions along the length of the bed in order to accommodate patients or occupants of differing heights. This, thereby, enables the knee support to be adjusted to cooperate with the location of the knees of the individual occupant.

20

All possible movements of the bed may be controlled by a hand held unit in order for the occupant to achieve the most comfortable position themselves.

25 The frame may be provided in a modular format whereby the sections of the frame and the connectors are provided in a kit. In addition, the movement means for the sections may be arranged to be easily connected and removed from the frame using quick connectors, for example through pins  
30 extending through cooperating apertures. The knee support may also be provided as a modular part. This arrangement, thereby, enables a nursing home to have a plurality of the adjustable frames with a lesser number of movement means

and knee supports. The movement means and knee supports can, therefore, be connected to the beds of both patients who require the movement means or knee support. This means that patients and beds do not have to be moved  
5 around within the nursing home in order for the patients to have a suitable bed. This is, therefore, more economical and efficient for the nursing home.

The beds are suitable for use in a nursing home or in a  
10 patient's own home or in other suitable places.

The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and  
15 which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

All of the features disclosed in this specification  
20 (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

25

Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated  
30 otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

The invention is not restricted to the details of the foregoing embodiment(s). The invention extend to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims,  
5 abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

**Claims**

1. An elongate frame for a bed comprising at least one lateral section which is moveable relative to the frame.
- 5 2. A frame as claimed in claim 1, in which the frame comprises two lateral sections which are moveable relative to the frame.
- 10 3. A frame as claimed in claim 1 or claim 2, in which the or each lateral section is hinged to the frame.
4. A frame as claimed in claim 3, in which the or each lateral section is hinged to a longitudinal support  
15 section of the frame.
5. A frame as claimed in claim 4, in which the longitudinal support section is centrally located with respect to the elongate frame.
- 20 6. A frame as claimed in any preceding claim in which the or each lateral section is arranged to move from a first position to a second position in which the or each lateral section provides a lateral incline or decline with respect  
25 to the first position.
7. A frame as claimed in claim 6, in which the first position is substantially horizontal.
- 30 8. A frame as claimed in claim 6 or claim 7, in which in the second position the or each lateral section is laterally inclined from the centre of the frame to the lateral side of the frame.

9. A frame as claimed in any of claims 6 to 8 in which the or each lateral section can be inclined up to substantially 90 degrees.
- 5 10. A frame as claimed in any preceding claim in which the or each lateral section laterally extends from the centre of the frame for substantially half the width of the frame.
- 10 11. A frame as claimed in any preceding claim, in which the or each lateral section longitudinally extends substantially the full length of the frame.
12. A frame as claimed in any preceding claim in which the or each lateral section is arranged, in use, to support at least a part of a mattress.
- 15 13. A frame as claimed in claim 12, in which two lateral sections are arranged, in use, to support substantially the whole of the mattress.
- 20 14. A frame as claimed in any preceding claim in which the or each lateral section comprises at least one retaining member which is arranged, in use, to prevent movement of a mattress relative to the frame.
- 25 15. A frame as claimed in claim 14, in which the retaining members are arranged adjacent to each edge of the frame.
- 30 16. A frame as claimed in any preceding claim in which the or each lateral section comprises a series of slats.

17. A frame as claimed in any preceding claim in which means are provided for moving the or each lateral section relative to the frame.

5 18. A frame as claimed in claim 17, in which the means are electronically operated.

19. A frame as claimed in claim 18, in which the means are electronically operated using a remote control unit.

10

20. A frame as claimed in any of claims 17 to 19, in which the means comprise a unit having an extending member extending therefrom.

15 21. A frame as claimed in claim 20, in which the extending member moves relative to the unit.

22. A frame as claimed in claim 20 or claim 21, in which the extending member is powered by mechanical means.

20

23. A frame as claimed in claim 22, in which the mechanical means is electronically controlled.

24. A frame as claimed in any of claims 20 to 23, in which  
25 the unit is pivotably connected to the frame.

25. A frame as claimed in any of claims 2 to 24 in which each lateral section has independent means for moving independently relative to the frame.

30

26. A frame as claimed in any preceding claim in which the frame has a head and back support section.



27. A frame as claimed in claim 26, in which the head and back support section can be moved relative to the frame.

28. A frame as claimed in claim 27, in which the head and  
5 back support section can be inclined relative to the frame.

29. A frame as claimed in claim 27 or claim 28 in which means are provided to move the head and back support  
10 section relative to the frame.

30. A frame as claimed in any preceding claim in which the frame comprises a leg support section.

15 31. A frame as claimed in claim 30, in which the leg support section is arranged to move relative to the frame.

32. A frame as claimed in claim 31, in which the leg support section can be declined relative to the frame.  
20

33. A frame as claimed in claim 31 or claim 32, in which means are provided to move the leg support section relative to the frame.

25 34. A frame as claimed in any preceding claim in which the frame has a knee support.

35. A frame as claimed in claim 34 in which the knee support is moveable relative to the frame.  
30

36. A frame as claimed in claim 35 in which the knee support is arranged, in use, to raise a part of a mattress.

37. A frame as claimed in claim 36, in which the knee support is arranged, in use, to raise a laterally extending part of a mattress.

5

38. A frame as claimed in claim 37, in which the knee support is arranged, in use, to raise a laterally extending part of a mattress which extends across substantially the full width of the mattress.

10

39. A frame as claimed in any of claims 34 to 38, in which the knee support comprises a laterally extending member.

40. A frame as claimed in claim 39, in which the knee support comprises two laterally extending members.

15

41. A frame as claimed in claim 39 or claim 40 in which means are provided to raise and lower the or each laterally extending member with respect to the frame.

20

42. A frame as claimed in any of claims 34 to 41 in which the knee support is movable along a longitudinal axis of the frame.

25 43. A kit for assembly into a frame, the frame being in accordance with claim 1.

44. A bed comprising a mattress and a frame, the frame being in accordance with claim 1.

30

45. A frame substantially as described herein with reference to Figures 1 to 11.

46. A kit substantially as described herein with reference to Figures 1 to 11..

47. A bed substantially as described herein with reference  
5 to Figures 1 to 11.



Application No: GB 0000341.8  
Claims searched: 1-47

22 Examiner: N Franklin  
Date of search: 26 April 2000

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.R): A4L (LBRB, LBRC, LBRD, LBRE, LBRF, LCC)

Int CI (Ed.7): A61G 7/00, 7/008, 7/015

Other: Online: EPODOC, JAPIO, WPI

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2286334A (LIAO) See page 16 line 21- page 17 line 5	1-8 at least
X	DE 3148892A1 (SPRENGER) See Figure 5	1-8 at least
X	FR 0026157 (CHUANG) See abstract	1-8 at least
X	JP 090056753 (FUKUDA) See abstract in English	1-8 at least
X	US 5699566 (CHUANG) See whole document	1-8 at least
X	US 5303437 (HUNG) See whole document	1-8 at least
X	US 5224228 (LARRIMORE) See whole document	1-8 at least
X	US 4225988 (CARY) See whole document	1-8 at least

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.

& Member of the same patent family

A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.